



Acoustics — Measurements of sound insulation in buildings and of building elements — Part 9 : Laboratory measurement of room-to-room airborne sound insulation of a suspended ceiling with a plenum above it

Acoustique — Mesurage de l'isolation acoustique des immeubles et des éléments de construction — Partie 9 : Mesurage en laboratoire de l'isolation au bruit aérien de pièce à pièce par un plafond suspendu surmonté d'un vide d'air

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 140/9 was prepared by Technical Committee ISO/TC 43, *Acoustics*.

Acoustics — Measurements of sound insulation in buildings and of building elements —

Part 9 : Laboratory measurement of room-to-room airborne sound insulation of a suspended ceiling with a plenum above it

1 Scope and field of application

This part of ISO 140 specifies a laboratory method of measuring the airborne sound insulation of a suspended ceiling with a plenum of defined height mounted above an acoustical barrier which separates two rooms of a specified test facility.

This method utilizes a laboratory space so arranged that it simulates a pair of horizontally adjacent, typical offices or rooms sharing a common suspended ceiling system, plenum space and a dividing wall. The dividing wall extends to the underside of the ceiling system which at the junction is either continuous or discontinuous.

The quantity being measured is the airborne sound insulation between two rooms of a specified test facility when the sound transmitted by paths other than the suspended ceiling and common plenum space is negligible. This quantity is called the suspended ceiling normalized level difference.

The method may be extended to include the study of composite ceiling systems comprising the ceiling material and other components such as luminaires and ventilating systems.

The method may also be extended to the study of the additional sound insulation that may be achieved by auxiliary systems, such as material used either as plenum barriers or as backing for all of, or part of, the ceiling.

2 References

ISO 140/2, *Acoustics — Measurement of sound insulation in buildings and of building elements — Part 2 : Statement of precision requirements.*

ISO 354, *Acoustics — Measurement of sound absorption in a reverberation room.*

ISO 717/1, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 1 : Airborne sound insulation in buildings and of interior building elements.*

IEC Publication 225, *Octave, half-octave and third-octave band filters intended for the analysis of sounds and vibrations.*

3 Definitions

For the purpose of this part of ISO 140, the following definitions apply.

3.1 average sound pressure level in a room : Ten times the common logarithm of the ratio of the space and time average of the sound pressure squared to the square of the reference sound pressure, the space average being taken over the entire room with the exception of those parts where the direct radiation of a sound source or the near field of the boundaries (wall, etc.) is of significant influence. This quantity is denoted by L and is expressed in decibels.

$$L = 10 \lg \frac{p_1^2 + p_2^2 + \dots + p_n^2}{np_0^2} \quad \dots (1)$$

where

$p_1, p_2, \dots, p_n$ are the r.m.s. sound pressures at n different positions in the room;

$p_0 = 20 \mu\text{Pa}$ is the reference sound pressure.

3.2 level difference : The difference in the space and time average sound pressure levels produced in two rooms by a sound source in one of the rooms. This quantity is denoted by D and is expressed in decibels.

$$D = L_1 - L_2 \quad \dots (2)$$

where

L_1 is the average sound pressure level in the source room;

L_2 is the average sound pressure level in the receiving room.